

REVISIONS			
SYMBOL	DESCRIPTION	DATE	APPROVAL
---	Released	1/23/95	<i>[Signature]</i>

SHEET REVISION STATUS																				
SH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
REV	--	--	--	--	--	--	--	--	--	--	--									
SH	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
REV																				
SH	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
REV																				

ORIGINATOR K. Kim / UNISYS <i>[Signature]</i>	DATE 1/19/95	FSC: 5961
APPROVED S. Archer-Davies / UNISYS <i>[Signature]</i>	1/19/95	PROCUREMENT SPECIFICATION FOR DIODE, LIGHT EMITTING, INFRARED, GaAlAs.
CODE 715 APPROVAL C. HAKUN / GSFC <i>[Signature]</i>	1/23/95	
CODE 311 APPROVAL J. M. Lohr / GSFC <i>[Signature]</i>	1-23-95	
CODE 311 SUPERVISORY APVL R. L. Chinnapongse / GSFC <i>[Signature]</i>	1/23/95	S-311-P-791

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND 20771

CAGE CODE: 25306

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1. **SCOPE**

1.1 Scope. This source control drawing defines the requirements for a GaAs infrared light emitting diode for use in space flight applications.

1.2 Part number. The part number for parts which meet the requirements of this specification shall be G311P791.

1.3 Absolute maximum ratings. Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.

Power Dissipation (P_D) 1/:	100 mW.
Reverse Voltage (V_R):	5 V.
Continuous Forward Current (I_F) 2/:	100 mA.
Soldering temperature:	240 °C.
Thermal Resistance ($R_{\theta JA}$):	TBD °C/W.
Thermal Resistance ($R_{\theta JC}$):	TBD °C/W.
Storage temperature range:	-65°C to +150°C.

1/ Derate linearly at 1.0mW/°C above 25 °C.

2/ Derate linearly at 1.33mA/°C above 25 °C.

1.4 Recommended operating conditions.

Operating temperature range: -55°C to +125°C.

2. **APPLICABLE DOCUMENTS**

2.1 Government specification and standards. The following documents form a part of this drawing to the extent specified herein.

MILITARY

SPECIFICATION

MIL-S-19500 Semiconductor Devices, General Specification for

STANDARDS

MIL-STD-750 Test Methods for Semiconductor Devices

MIL-STD-883 Test Methods and Procedures for Microelectronics

MANUFACTURE'S

SPECIFICATION

QE 62000-300 Test Procedure, "S" Level PILL Pack LED

FC 62000-300A Space Level PILL GaAs Light Emitting Diode

OTHER PUBLICATIONS

ASTM

E595

Material from Outgassing in a Vacuum Environment, Total Mass and Collected Volatile Condensable, Standard Test Method for.

- 2.2 Order of precedence. In the event of a conflict between this drawing and the applicable documents cited herein, the order of precedence shall be this drawing, MIL-S-19500, and the remaining applicable documents.

3. **REQUIREMENTS**

- 3.1 General. The devices procured to this specification shall be made from manufacturer's part number, 62000-300, which has been processed to the JANS requirement of MIL-S-19500, in accordance with Manufacturer's processing procedures detailed in FC 62000-300, revision A, and QE 62000-300, prior to the attachment of the leads. The 62000-300 shall be modified by attaching the two leads in accordance with figure 1. After the lead attachment, the parts shall be subjected to the screening and qualification tests detailed herein.
- 3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-S-19500, JANTXV and herein.
- 3.2.1 Case outline. The case outline shall be in accordance with figure 1.
- 3.2.2 Lead attachment. Two leads (one each for Anode and Cathode) shall be attached, in accordance with figure 1 herein, to the PILL type Packaged base part, 62000-300, which has been subjected to and passed the screening and quality conformance inspection of in accordance with FC 62000-300, revision A, and QE 62000-300.
- 3.2.3 Thermal Vacuum Outgassing. All nonmetallic materials used in the attachment of the leads shall have a maximum total mass loss (TML) of 1.0 percent of the original specimen mass and shall have a maximum volatile condensable material (VCM) of 0.1 percent of the original specimen mass when tested in accordance with ASTM E595 .
- 3.2.4 Lead Finish. The lead finish shall be gold plated Kovar.
- 3.3 Electrical performance specifications. The electrical performance characteristics, of the leaded parts, are as specified in Table I.

- 3.4 Product assurance requirements. The delivered devices shall be those which have been subjected to and have passed the applicable requirements, tests, and inspections detailed herein.
- 3.4.1 General. Devices furnished under this specification shall be devices which are designed and fabricated at an approved facility as required herein.
- 3.4.1.1 Certification and qualification. The device manufacturer shall be certified and qualified to produce Semiconductor devices compliant to MIL-S-19500 for JANTXV level. The procuring activity may perform an audit to determine capability of a manufacturer in lieu of the manufacturer being listed on the QPL-19500.
- 3.4.1.2 Screening. All devices delivered to this specification shall be made from the base part, 62000-300, which has been subjected to and have passed the screening in accordance with Manufacturer's processing procedures detailed in FC 62000-300, revision A, and QE 62000-300. After attachment of leads as detailed in paragraph 3.2.2 herein, all devices shall be subjected to the additional screening tests in accordance with section 4.3 herein.
- 3.4.1.3 Quality conformance inspection (QCI). All devices delivered to this specification shall be made from the base part, 62000-300, which has been subjected to and have passed the sample QCI in accordance with Manufacturer's processing procedures detailed in FC 62000-300, revision A, and QE 62000-300. After attachment of leads as detailed in paragraph 3.2.2 herein, all devices shall be subjected to the additional sample QCI tests in accordance with section 4.4 herein.
- 3.4.1.4 Traceability. Traceability shall be in accordance with MIL-S-19500, JANTXV level.
- 3.5 Marking. Each device shall be marked as following:
- a. Part number from paragraph 1.2 herein.
 - b. Manufacturer's name, logo or cage code.
 - c. Lot date code.
 - d. Electrostatic Discharge Sensitivity Identifier, per MIL-S-19500.
 - e. Serial Number.

If device size precludes above marking requirements on the individual part, all of the marking shall be placed on the individual package for each part.

3.6 Certificate of compliance. A certificate of compliance shall be submitted with the delivered parts and shall state that the manufacturer's product meets the requirements of this drawing.

4. **QUALITY ASSURANCE PROVISIONS**

4.1 Responsibility for inspection. Unless otherwise specified in this specification or the purchase order, the manufacturer is responsible for performing all inspections specified herein using their own facilities or an outside laboratory acceptable to the procuring activity. Upon receipt of product, the procuring activity reserves the right to perform any of the inspections set forth in this specification.

4.2 Sampling and inspection. Sampling and inspection procedures shall be as specified in Tables II and III herein.

4.3 Additional Screening. Screening shall be in accordance with Table II herein.

4.4 Additional Quality conformance inspection. Quality conformance inspection shall consist of the group B inspection specified in Table III herein.

5. **PACKAGING**

5.1 Packaging requirements. The requirements shall be in accordance with MIL-S-19500.

5.2 Unit package identification and marking. The unit package shall be marked with the following:

- a. NASA/GSFC H4 identification number (Cage Code) (25306).
- b. Device part number per 1.2.
- c. Manufacturer's name and H4 code identification number (Cage Code).
- d. Date code in accordance with MIL-STD-1285.
- e. Inspection lot number.
- f. ESD sensitivity warning symbol.
- g. Quantity in container
- h. Purchase order number.

- 5.3 Shipping container. The devices shall be packaged and delivered in ESD protective containers. The shipping container shall be legibly marked with the following information.
- a. Purchase order number.
 - b. Device part number.
 - c. Manufacturer's name and H4 identification number (Cage Code).
- 5.4 Deliverable data package. The data package for each shipment shall include the following:
- a. Cover sheet with traceability information and serial number range.
 - b. Certificate of conformance.
 - c. Copies of actual processing and screening travelers. (Both on unleaded base parts and the delivered parts with the lead attached)
 - d. Radiography report and film (unleaded base part).
 - e. Screening attributes data (both base parts and leaded parts).
 - f. Burn-in variables and attributes data reported by device serial number (unleaded base part).
 - g. Burn-in delta variables data (unleaded base part).
 - h. Wafer Lot Acceptance Test Report (unleaded base part).
 - i. Destructive Physical Analysis Report (unleaded base part).
 - j. Waivers, if any.
 - k. Group B attributes data (both base parts and leaded parts).

6. **NOTES**

- 6.1 Notice. When GSFC drawings, specifications, or other data are sent for any purpose other than in connection with a definitely related GSFC procurement operation, the United States government thereby incurs no responsibility nor any obligation whatsoever. The fact that GSFC may have formulated, furnished, or in any way supplied said drawings, specifications or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any persons or corporations or conveying any rights or permission to manufacture, use, or sell any patented invention that may be in any way related thereto.
- 6.2 Qualifying activity. The identification and contact address of the qualifying activity shall be as follows:
- Custodian
Goddard Space Flight Center
Greenbelt, Maryland 20771
- ATTN. QPL Administrator
Code 311.2
- 6.3 Approved Source.
- Micropac Industries Inc
905 E. Walnut Street
Garland, Texas 75046.

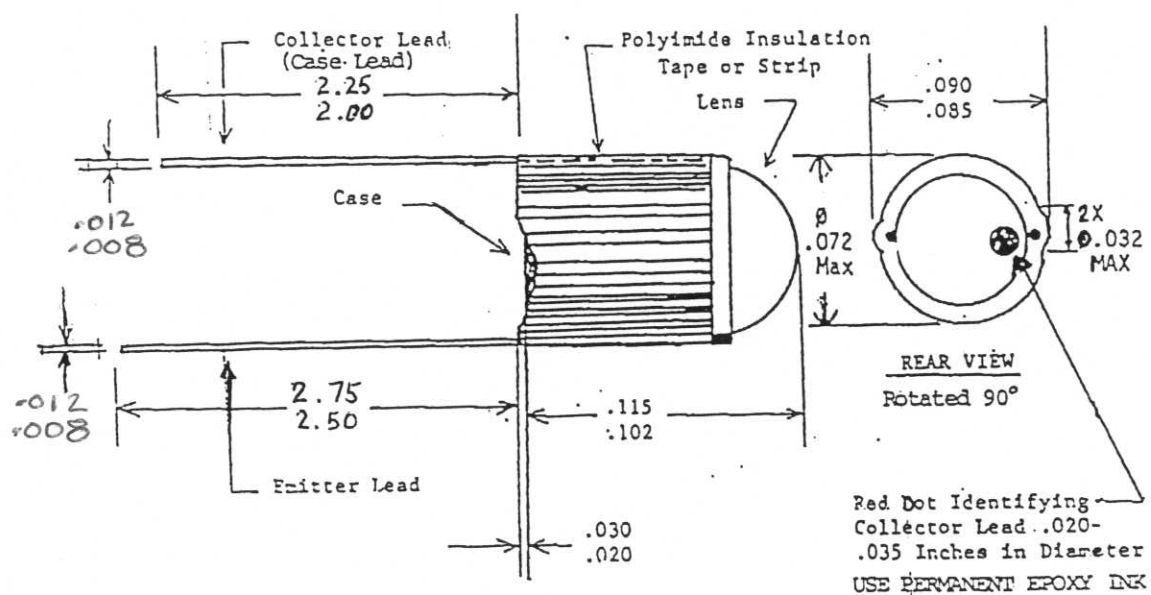


Figure 1. Case Outline

Table I. Electrical Characteristics
(Unless otherwise noted, $T_A = 25^\circ\text{C}$)

PARAMETER	Symbol	CONDITION	MIN	TYP	MAX	UNITS
Total Output Power	P_O	$I_F = 50\text{ mA}$	1.5			mW
Peak Wavelength	λ_P	$I_F = 50\text{ mA}$	910	930	950	nm
Spectral Bandwidth at 50%	$\Delta\lambda$	$I_F = 50\text{ mA}$		80	100	nm
Half-Intensity Beam Angle	θ_{hp}	$I_F = 50\text{ mA}$		18		Deg.
Forward Voltage	V_{F1} V_{F2}	$I_F = 50\text{ mA}$, $T_A = +25^\circ\text{C}$ $T_A = -55^\circ\text{C}$			1.5 2.0	V
Reverse Breakdown Voltage	V_R	$I_R = 10\text{ }\mu\text{A}$	5			V
Reverse Current	I_{R1} I_{R2}	$V_R = 3\text{ V}$, $T_A = +25^\circ\text{C}$ $T_A = +100^\circ\text{C}$			100 1,000	μA

Table II. Additional Screening Requirements

Inspection/Test	MIL-STD-750	
	Methods	Conditions
1. High Temperature Bake	1031	$T_A = 125\text{ }^{\circ}\text{C}$, 96 Hr.
2. Temperature Cycling	1051	Cond. B, 20 Cycles, between $-65\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$.
3. Constant Acceleration	2006	force = 20,000G, Y_1 Orientation Only.
4. Hermetic Seal a. Fine Leak b. Gross Leak	1071	Cond. H. Cond. C.
5. Optical & Electrical Measurements		Measure P_O , V_{F1} , V_{F2} , I_{R1} , I_{R2} , and V_R of Table I herein, Read and Record Data.
6. External Visual	2071	3 to 10X

Table III. Additional Group B Inspection

Inspection/Test	MIL-STD-750		Sample Size
	Methods	Conditions	
Terminal Strength	2036	Cond. E.	6(0)
Solderability	2026		
Mechanical Shock	2016	Nonoperating, 1500g's, 0.5ms, 5 blows in each orientation: X1, Y1, and Z1.	
Vibration, Variable Frequency	2056	Non-operating, 50G min.	
Thermal Shock	1056	Cond. B,	
Constant Acceleration	2006	Y1 orientation: at 20,000G min.	
Hermetic Seal a. Fine Leak b. Gross Leak	1071	Cond. H Cond. C.	